# GERMPLASM RESOURCES INFORMATION NETWORK

---

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

BELTSVILLE AREA

BELTSVILLE AGRICULTURAL RESEARCH CENTER

PLANT GENETICS AND GERMPLASM INSTITUTE

DATABASE MANAGEMENT UNIT

Third Revision

October 5, 1984

## WHAT IS GRIN?

Plant germplasm within the United States is managed by the National Plant Germplasm System (NPGS). One of the major structural components of this system is the Germplasm Resources Information Network (GRIN) which is used for management and operation as well as enhanced communication to scientists regarding the location and characteristics of germplasm they may wish to obtain for research purposes. The major purpose of the GRIN is to serve as a central repository of information concerning major aspects of plant germplasm in the NPGS and to provide ready accessibility of this information to all users of this system.

WHY HAVE GRIN

## Importance of Germplasm

Plant germplasm is the raw material required by plant breeders for the development of new, superior crop varieties that can ensure a stable, plentiful supply of high quality food, feed and fiber. Most of the plants from which the United States derives its food and fiber were introduced from other countries. The list of economically important native plants is very short and includes sunflowers, cranberries, blueberries, strawberries, pecans, hops, range grasses, conifers, and hardwoods.

There are large gaps in the genetic diversity base of some crops, particularly the wild species and primitive varieties that may contain genes for disease and insect resistance and other desirable traits. Although found in many areas of the world, these sources of diversity are rapidly being depleted, displaced, or abandoned. Once lost, these sources will never again be available to mankind. The need for these diverse sources becomes apparent when the genetic vulnerability of present American monoculture is examined while the constant battle against pathogens continues.

## Plant Introductions and the NPGS

The American Government recognized early the need for a continuing search for more adaptable crops. As early as 1819, American consuls

overseas were urged to send useful plants back to the United States. From this start, the essential elements of the present plant germplasm system developed gradually. This system developed into the NPGS whose goal is to provide on a continuing, long term basis the plant genetic diversity needed by farmers and public and private plant scientists to improve productivity of crops and minimize the vulnerability of those crops to biological and environmental stresses.

Minimizing crop losses through control of biological and environmental stresses is far more difficult and costly than through increasing the genetic diversity among varieties of a given crop. Therefore, an NPGS objective is to broaden the genetic diversity of a crop throughout its production areas by having that production come from an array of varieties, all productive but each different from the others in its range of tolerance to one or more potential stresses. Collection and introduction of new germplasm through various means is the first step toward achievement of this goal.

The NPGS now maintains over 400,000 accessions (samples) of germplasm in the form of seed and vegetatively propagated stocks. These accessions are primarily landraces and unimproved germplasm from foreign sources. New accessions are added to the NPGS at a rate of 7,000 to 15,000 per year. The need for the actual accession to enter the germplasm system is paralleled by the need for information about the accession to be available to users of the system. The immense size of the system creates a challenge for information management. Difficulty of obtaining information, lack of uniformity concerning this information, and its overall poor treatment prompted the NPGS to

integrate an information management system as a major structural component. The Germplasm Resources Information Network was designed and developed to act as this system.

## BRIEF HISTORY

A feasibility study was conducted during 1976-77 which investigated and identified the need for information management systems in the efficient collection, conservation, distribution and utilization of plant germplasm in the National Plant Germplasm System. This study drew the following conclusions about the existing information-management system for germplasm. "An information system exists within the plant genetics resources community of the United States but this system lacks the organization, communication techniques, trained personnel, and funding to satisfy the requirement of the NPGS community." From this study the USDA Agricultural Research Service (ARS) recognized the critical need for a nationally unified information system to serve the diverse needs of the NPGS. The NPGS' Germplasm Resources Information Network (GRIN) came about through this realization. The developmental phase of this network was the Germplasm Resources Information Project (GRIP). This project was established under a five-year cooperative agreement with the Laboratory for Information Science in Agriculture (LISA) to develop a computer-based information system.

Analysis of the diverse needs of the germplasm community identified two groups of information users within the NPGS. One group, the suppliers, consists of those who acquire, maintain, and distribute germplasm and data, such as curators and staffs of the National Seed Storage Laboratory (NSSL) and Regional Plant Introduction Stations (RPIS). A second, or demand group, consists of plant breeders, scientists and other researchers who use the germplasm resource and its data.

Further analysis identified specific needs of both groups. Small scale prototypes were then constructed to meet the needs of the supply side as well as to verify the objectives of each site. From the evaluation of these prototypes, a user-oriented approach was selected for design development.

In the evaluation and design of the information system, a centralized computer center was selected to optimize operational speed for all users. A 'Database' concept was adopted to enhance information by reducing redundancy and by 'linking' together in one location most of the pertinent information about a particular germplasm sample (accession) --from its native habitat to the most recent characteristic and evaluation results. This centralization also allows researchers access to a more extensive collection of samples from which to choose, thereby reducing the possibility of overlooking a potentially valuable collection. Maintenance of information is supported through automatic updates that are quickly available to everyone. The most accurate and current information is thus accessible without time consuming notifications. Multilevel system updates are made by individuals and organizations recognized as experts in that particular area. For instance, plant taxonomists will monitor and maintain taxonomic nomenclature, PIO will maintain information concerning the sample's origin and particulars about its introduction, the RPIS' maintain viable samples and serve as points of contact for sample availability, and the breeders, growers and researchers provide evaluation and characteristic information.

To make the data understandable at a National level, Crop Advisory

Committees (CAC) were developed simultaneously with GRIP. These committees, composed of crop experts from all parts of the NPGS, develop standard evaluation and characterization criteria for their particular crop as well as descriptor lists and standard methods of measurement and reporting.

The now completed design phase brought the transformation of GRIP to GRIN. On July 1, 1983 GRIN was transferred to the Plant Genetics and Germplasm Institute (PGGI) within the Agricultural Research Service, USDA, located in Beltsville, Maryland. The management and final development of the network are controlled by the Database Management Unit (DBMU). Implementation of the system was finalized in February, 1984.

HOW DOES GRIN WORK?

GRIN has three important functions to fulfill. First, it serves as a central repository for valuable germplasm information that is accessible by the entire germplasm community. Second, it is a means for the CAC's to begin standardization of crop descriptors. Third, it provides a mechanism for each of the RPIS' and other sites to handle daily inventory.

Anyone who can justify a need for accessing the GRIN database can obtain permission to use it. Access to the database can only be gained by submitting a request to the DBMU and having a logon and password assigned for the Prime computer. In addition, a password is also required to access the database.

The database is designed to permit flexibility to the users in storing and retrieving information. A network design is one that allows multiple paths to the data but has linkages that connect all the data together. The GRIN Data Model presents a pictorial view of how segments of the information are related. Appendix I contains a list of all data elements in the database as of the date of this document.

Retrieving information from the database is accomplished by executing a Prime procedure called VISTA. All information stored in the database is accessible, however, access to some data is restricted to the site-owner. NOTE: A user will find it essential to understand some basic principles of a database management system and the diagram of the GRIN DATA MODEL. These topics are thoroughly discussed in the Grin

Data Retrieval User Manual. Examples given in Attachment II illustrate extracting information from the database.

PIO has sole responsibility for maintaining accurate passport data, geographic acquisition, and geographic origin information. The Plant Exploration and Taxonomy Laboratory (PETL) will maintain all plant taxonomy. PIO and PETL will be able to modify information in their respective areas, however any user possesses retrieval access. Public users and participating sites are only permitted to retrieve this information. They cannot modify its contents.

The RPIS' and other participating germplasm sites are the owners of the inventory and characteristic data for their respective site. This means these sites are responsible for maintaining accurate characteristic and inventory information. They also have system procedures available for ensuring data integrity. The public users have permission to retrieve all but inventory data from the database; this can only be accessed by its owner.

As stated earlier, the information residing in the database is owned and maintained by sites within the NPGS while the DBMU acts as the caretaker of the system. The DBMU maintains all application computer software (programs), the database management system (DBMS), liaison with the computer operations (Prime minicomputer), and volume data loading. The DBMU also provides technical assistance to users in preparation of software that is unique for a specific site. Database access and system security are also important system management tasks.

Contact the following office for any additional information:

Database Manager

United States Department of Agriculture

Agricultural Research Service

Plant Genetics and Germplasm Institute

Beltsville Agriculture Research Center-West

Building 001, Room 130

Beltsville, Md. 20705

Phone: 301-344-3318

FTS: 8-344-3318

GRIN HARDWARE

THE PRIME -

GRIN is contained on a PRIME 750 mini-computer. The 750 is housed, operated and maintained by the Communications and Data Services Division (CDSD) of ARS, located in the National Agricultural Library (NAL), Beltsville Agricultural Research Center (BARC) in Beltsville, Maryland.

The 750 has a 32-bit architecture and currently has the following hardware features:

- 3.5 Million bytes (Mb) of main memory
- 2400 Mb of user available disk space (1500 Mb owned by GRIN)
- 8 300 Mb disk drives, 2 controllers
- 1 9-Track 1600/6250 bpi Tape Drive
- 3 Synchronous Communications Ports (1 9600 and 2 4800 Baud)
- 48 Asynchronous Communications Ports:
  - 15 Direct 9600 Baud
  - 8 Dialups 1200 Baud
  - 4 Dialups 300 Baud
  - 12 Telenet 300/1200 Baud
  - 9 currently unused

Prime software features include: DBMS; F77 (Fortran ANSI X3.9-1978); DPTX (3270) Communication with the IBM mainframe at the Washington Computer Center; the FORMS package for data entry and manipulation

template creation; INFO8S a relational data management utility; and INFOTEXT; SCREEN and TEXTPLUS, word processing packages: COBOL, FTN (FORTRAN IV), BASIC, BASICVM and PL1G compilers. Through a NETLINK to another Prime 750 also located at NAL, users have full HASP support, as well as electronic mail.

Terminals -

GRIN software written for fully participating curatory sites and inventory managers uses the FORMS package and assumes the user's terminal is a Perkin- Elmer OWL model 1251.

Many other teminal types may use the special forms capabilities of INFO although these have not been verified by the DBMU. They are: ACT-IV; ACT5A; Adds Consul; Lear Siegler ADM-1, ADM-42 and Xerox 850 Word Processor; Lear Siegler ADM-3A and ADM-31; Anderson Jacobson model 510/510A; ANSI; Adds Regent 20, 25, 40, 60, 100 and 200, also Teleray; AT; Beehive; CYBERNEX; Datapoint 8200; DELTA; Datagraphics 132A and 132B; DMD3; Data media Elite 1521; Hazeltine 1510; Hewlett-Packard 2621; IBM 3101; Infoton 100 and 400; Informer 304; DEC VT100; Lynwood; Newbury; Perkin-Elmer OWL, FOX, BANTAM and the OWL 1200 series; SAMP; Soroc; Televideo 912, 920 and 950; Volker- Craig 404 and 414; DEC VT52; ZENITH Z19 and TAB.

SCREEN supports the following terminal types:

Lear Siegler ADM-31, ADM-42; Beehive; Hazeltine 1510; Hewlett-Packard 2621; Infoton; Adds Regency; 40; Perkin-Elmer OWL

1251; TAB 132/15 and 132/15-G; Televideo 912, 920, 925 and 950; Terminalsmith TS-1; Volker-Craig 404; Heath ZENITH Z19.

Only the Beehive PT45, Perkin-Elmer Model 1251 (OWL) and Televideo 950 can make use of FORMS; these three plus the ADM-42 can interface with DPTX. Any terminal with RS232C interfaces can use all other Prime features.

Telenet -

TELENET users are expected to have ID's and passwords. There are TELENET and WATS numbers available for use.

# Appendix I

There are more than 300 unique data elements in the database. The following list describes the area of the database the information resides in, records within the area, and data elements in each record.

NOTE: Char = Character; # = Numeric; & = Real Variable;

*STANDARDS AREA*

Family Record

| | |
|---|---|
| 30 char | Family name |
| 40 char | Family authority |
| 4 char | PIO code |

Genus Record

| | |
|---|---|
| 30 char | Genus name |
| 40 char | Genus authority |
| 4 char | PIO code |

Species Record

| | |
|---|---|
| 30 char | Species name |
| 40 char | Species authority |
| 4 char | PIO code |

Family Synonym Record

| | |
|---|---|
| 30 char | Family synonym name |
| 40 char | Family synonym authority |
| 12 char | Date created |

Binomial Synonym Record

| | |
|---|---|
| 30 char | Binomial Genus name |
| 30 char | Binomial Species name |
| 40 char | Binomial Genus authority |
| 40 char | Binomial Species authority |
| 12 char | Date created |

Geographical Acquire Record

| | | |
|---|---|---|
| 26 | char | Acquisition country |
| 20 | char | Acquisition state |
| 4 | char | PIO code |

Geographical Origin Record

| | | |
|---|---|---|
| 26 | char | Origin country |
| 20 | char | Origin state |
| 4 | char | PIO code |

*ACCESSION AREA*

Accession Record

| | | |
|---|---|---|
| 10 | char | Primary identifier |
| 30 | char | Subspecies |
| 36 | char | Variety |
| 50 | char | Cultivar |
| 30 | char | Common name |
| 12 | char | Date received |
| 12 | char | Date released |
| 6 | char | Entry logonid |
| 6 | char | Primary supply site |
| 10 | char | Inventory identification |
| 12 | char | Date entered |
| 12 | char | Date PI assigned |
| 12 | char | Date Taxonomy assigned |
| 3 | char | Attribute flag |
| 3 | char | PIO approved flag |
| 3 | char | PIO Donor-Held flag |
| 13 | char | PIO Crop category |
| 18 | char | PIO Life form |
| 16 | char | PIO Form received |
| 20 | char | PIO Improvement status |
| 76 | char | Pedigree |

Accession Supplemental Record

| | | |
|---|---|---|
| 10 | char | Supplemental label |
| 60 | char | Supplemental narrative |

Accession Re-identification Record

```
  30 char   Submitting cooperator
   8 char # Re-identification number
   8 char # Service lot
  12 char   Re-identification date taxonomy assigned
  12 char   Re-identification date taxonomy changed
  60 char   Original taxonomy
```

Accession Group Record

```
  20 char   Group name
   6 char   Group data manager
   4 char   Narrative count
  70 char   Narrative(OCCURS narrative count times, MAX of 15)
   4 char   Update class
```

Secondary Identifier Record

```
  10 char   Secondary identification
```

*DICTIONARY AREA*

Dataset Record

```
  30 char   Dataset query name
  70 char   Name
   6 char   Site
   4 char   Code
   4 char   Item Count
   8 char   Observation count
   6 char   Storage area
   4 char   Narrative count
  70 char   Narrative (occurs narrative count twice,
                       Max is 20 lines)
   3 char   Crop Advisory Committee flag
```

Descriptor Record

```
   4 char   Descriptor number
  30 char   Descriptor query name
  70 char   Name
  12 char   Category
   6 char   Subschema item name
  14 char   Schema item name
   4 char   Character length
   8 char   Low value
```

```
    8 char   High value
    4 char   Code count
    8 char   Fortran format
   12 char   Cobal format
    4 char   Definition count
   70 char   Definition (occurs definition count times,
                         Max is 5 lines)
    9 char   Type
    5 char   Editcheck
```

Code Record

```
   16 char   Code value
    4 char   Definition count
   70 char   Definition (occurs definition count time,
                         Max is 3 lines)
```

*EVALUATION AREA*

Environment Record

```
   20 char   Identification
   12 char   Date planted
   12 char   Date harvested
```

Environment Narrative Record

```
   20 char   Narrative label
   60 char   Narrative
```

Observation Record

```
   10 char   Accession identification
    4 char # Observation identification
    4 char # 51 unique data elments
    8 char #  7 unique data elements
    8 char & 12 unique data elements
   10 char   27 unique data elements
   30 char    7 unique data elements
   72 char    3 unique data elements
```

NOTE: The descriptor record contains a description of each item in the observation and where the item is at. (i.e. Flower color is in observation item 051)

*COOPERATOR AREA*

Cooperator Record

| | | |
|---|---|---|
| 20 | char | Last name |
| 20 | char | First name |
| 30 | char | Organization |
| 30 | char | Address line 1 |
| 30 | char | Address line 2 |
| 30 | char | Address line 3 |
| 20 | char | City |
| 20 | char | State |
| 10 | char | Zip code |
| 26 | char | Country |
| 12 | char | Telephone number |
| 6 | char | Region |
| 8 | char # | Identification number |
| 6 | char | Update logon (who entered cooperator) |
| 12 | char | Update date |
| 6 | char | Status |
| 3 | char | Class |

Cooperator Group Record

| | | |
|---|---|---|
| 6 | char | Site |
| 20 | char | Name |
| 6 | char | Data Manager |
| 4 | char | Access class |

Membership Record

| | | |
|---|---|---|
| 10 | char | Member role |

Donor Link Record

| | | |
|---|---|---|
| 35 | char | Accession identification |
| 70 | char | Narrative |

*SITE AREA*

Supply Site Record

| | | |
|---|---|---|
| 6 | char | Code |

```
 30 char   Name
 30 char   Organization
 30 char   Address line 1
 30 char   Address line 2
 30 char   Address line 3
 20 char   City
 20 char   State
 10 char   Zip Code
 26 char   Country
 12 char   Telephone
  6 char   Region
 20 char   Curator first name
 20 char   Curator last name
  4 char # Last order
```

Generic Order Record

```
  6 char   Site identification
  4 char   Order number
  2 char   Type
 12 char   Date required
 20 char   Last name
 20 char   First name
 30 char   Organization
 30 char   Address line 1
 30 char   Address line 2
 30 char   Address line 3
 20 char   City
 20 char   State
 10 char   Zip Code
 26 char   Country
 10 char   Requestor reference
 60 char   Curator comment
  4 char # Accession count
  4 char # Accession shipped
  4 char # Accession split
 30 char   File name
 76 char   Special Instructions (occurs 5 times)
 12 char   Date entered
 12 char   Date shipped
  6 char   Status
  3 char   File lock
```

Site Crop Record

```
  6 char   Site
 20 char   Crop Identification
  4 char & Hundred seed weight
  4 char & Conversion quantity
  4 char & Critical replenishment
```

```
   4 char & Critical distribution
   4 char # Critical retest interval
   4 char # Critical germination
   2 char   Measurement unit
   4 char & Ship quanity
   4 char   Maintenance technique
```

Inventory Record

```
   6 char   Site
  10 char   Accession identification
  10 char   Inventory identification
  12 char   Date received
  12 char   Date released
  10 char   Available comment
   4 char & Quantity on hand
   4 char & Quantity available
  12 char   Date planted
  12 char   Date harvested
  10 char   Location
   4 char   Pollination code
  10 char   Parent
  60 char   Comments
   4 char # Maintenance count
   4 char & Hundred seed weight
   4 char & Conversion quanity
   4 char & Critical replenishment
   4 char & Critical distribution
   4 char # Critical retest interval
   4 char # Germination
   2 char   Measurement unit
   4 char & Shipping quantity
   2 char # Germination number
            Germination (occurs germination number times,
                         max of 4 groups)
   4 char #     Percent normal seedling
   4 char #     Percent hard seed
   4 char #     Percent germination
   4 char #     Germination year
  12 char   Date entered
   4 char   Maintenance
   8 char   Availability flag
```

Inventory Group Record

```
   6 char   Site
  20 char   Name
   6 char   Data manager
```

Inventory Group Link Record

20 char Group link narrative

Supplier Link Record

20 char Supplier link narrative

# Appendix II

The following two examples show some of the typical VISTA procedure commands required to extract information from the database and display it on the computer terminal screen.

Example 1 illustrates a retrieval for beet characteristic data contained in the NC7-BETA dataset, but limited to skin color of white, pink, or red.

Example 2 illustrates a retrieval for chickpea characteristic data contained in the W6-CHICKPEA dataset, but limited to only those observations that have a flower set of 36 or fewer days.

```
OK> vista
[DBMS/QUERY Rev. 19.1.3]
> use subschema NC7-BETA of SCHEMA GRIN1-0
> unlock retrieval of areas evaluation-1-area,evaluation-2-area,~
> dictionary-area with'XXXXX'
> unlock rest of records dataset-record,descriptor-record,~
> observation-record with 'XXXXX'
> select from observation-record where skin-col = 'WHPIRD' ~
> and dataset-query-name = 'NC7-BETA'
 Total number of virtual records: 16


> display using nc7-beta2
```

NC-7 Beta characteristic data report 2

| ID | NUMBER | SDLG LF-SZ1 | SDLG LF-SZ1 | ROOT LEN1 | ROOT LEN2 | ROOT DIAM1 | ROOT DIAM2 | ROOT WGT1 | ROOT WGT2 |
|---|---|---|---|---|---|---|---|---|---|
| PI | 109040 | 5 | 7 | 15 | 27 | 6 | 13 | 223 | 1036 |
| PI | 116906 | 7 | 9 | 11 | 35 | 2 | 14 | 64 | 1463 |
| PI | 117115 | 7 | 7 | 14 | 25 | 3 | 8 | 186 | 393 |
| PI | 120701 | 3 | 7 | 7 | 16 | 4 | 6 | 46 | 193 |
| PI | 140353 | 7 | 7 | 7 | 15 | 4 | 12 | 38 | 819 |
| PI | 140356 | 7 | 7 | 7 | 16 | 4 | 9 | 61 | 542 |
| PI | 140361 | 5 | 7 | 6 | 11 | 5 | 14 | 82 | 1121 |
| PI | 171505 | 5 | 8 | 9 | 26 | 4 | 9 | 41 | 795 |
| PI | 172729 | 4 | 7 | 13 | 20 | 3 | 10 | 54 | 1007 |
| PI | 174063 | 5 | 7 | 7 | 37 | 5 | 15 | 85 | 3761 |
| PI | 176423 | 7 | 7 | 10 | 13 | 6 | 15 | 195 | 2057 |
| PI | 177276 | 7 | 7 | 12 | 21 | 8 | 13 | 275 | 712 |
| PI | 182144 | 6 | 6 | 7 | 18 | 6 | 11 | 181 | 710 |
| PI | 182146 | 5 | 8 | 14 | 22 | 6 | 10 | 224 | 786 |
| PI | 205987 | 6 | 6 | 8 | 28 | 4 | 11 | 57 | 1120 |

```
  PI  251042       6       6       6       24       3       13       61     2036
```

```
> display using nc7-beta5
```

NC-7 Beta characteristic data report 5

| ID | NUMBER | SOURCE | LIFE CYC | SDLG STEM-C | SDLG LEAF-C | MATR FOLG-C | DESIGN TYPE | ROOT SHAPE |
|---|---|---|---|---|---|---|---|---|
| PI | 109040 | TURKY | BI | GNYE | | GN | MA | TOLOCO |
| PI | 116906 | AFGH | ANBI | RDGN | GN | GN | SGMA | TOLOCO |
| PI | 117115 | TURKY | ANBI | RDGN | GN | GN | SGMA | TOLO |
| PI | 120701 | TURKY | ANBI | RDGN | GN | GN | MALF | LOCO |
| PI | 140353 | IRAN | BI | RDGN | GN | GN | MA | FLTOLO |
| PI | 140356 | IRAN | ANBI | RDGN | GN | GN | SGMA | FLTOCO |
| PI | 140361 | IRAN | ANBI | RDGN | GN | GN | MATB | GLTOHL |
| PI | 171505 | TURKY | ANBI | RDGN | GN | GN | SGMALF | LOCO |
| PI | 172729 | TURKY | BI | RDGN | GN | GN | SGMA | TOLO |
| PI | 174063 | TURKY | BI | RDGN | GN | GN | MA | GLTOHLLO |
| PI | 176423 | TURKY | BI | RDGN | GN | GN | SGMA | TOLO |
| PI | 177276 | SYRIA | ANBI | RDGN | GN | GN | SGMA | TO |
| PI | 182144 | TURKY | BI | RDGN | GN | GN | MA | TOHLCO |
| PI | 182146 | TURKY | BI | RDGN | GN | GN | SGMA | TOLO |
| PI | 205987 | SWEDN | BI | RDGN | GN | GN | SGMATB | TOLO |
| PI | 251042 | YUGO | BI | GN | GN | GN | SGMA | TOLO |

```
> quit
do you wish to terminate this session? y


OK> vista
[DBMS/QUERY Rev. 19.1.3]
> use subschema w6-chickpea of schema grin1-0
> unlock retrieval of areas evaluation-1-area,evaluation-2-area,~
> dictionary-area with 'XXXXX'
> unlock rest of records dataset-record,descriptor-record,~
> observation-record with 'XXXXX'
> select from observation-record where dataset-query-name = 'W6-CHICKPEA' ~
> and flwrset > '0' and flwrset le '36'
  Total number of virtual records: 12


> display using public format w6-chickpea1
```

W-6 Chickpea Characteristic Data Report 1

| ID | NUMBER | IDENT | DSCDE | STAND | FLWST | FLWCL | STMCL | HABIT |
|---|---|---|---|---|---|---|---|---|
| PI | 212891 | 1 | 1 | 0 | 36 | 4 | 2 | 3 |
| PI | 212891 | 2 | 1 | 0 | 36 | 4 | 2 | 3 |
| PI | 212892 | 1 | 1 | 0 | 36 | 4 | 0 | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PI | 212892 | 2 | 1 | 0 | 36 | 4 | 0 | 0 |
| PI | 222771 | 1 | 1 | 0 | 36 | 4 | 2 | 3 |
| PI | 222771 | 2 | 1 | 0 | 36 | 4 | 2 | 3 |
| PI | 254550 | 1 | 1 | 0 | 35 | 5 | 1 | 2 |
| PI | 254550 | 2 | 1 | 0 | 35 | 5 | 1 | 2 |
| PI | 273880 | 1 | 1 | 0 | 36 | 4 | 2 | 3 |
| PI | 273880 | 2 | 1 | 0 | 36 | 4 | 2 | 3 |
| PI | 360224 | 1 | 1 | 0 | 35 | 1 | 1 | 1 |
| PI | 360224 | 2 | 1 | 0 | 35 | 1 | 1 | 1 |

```
> display using public format w6-chickpea2
```

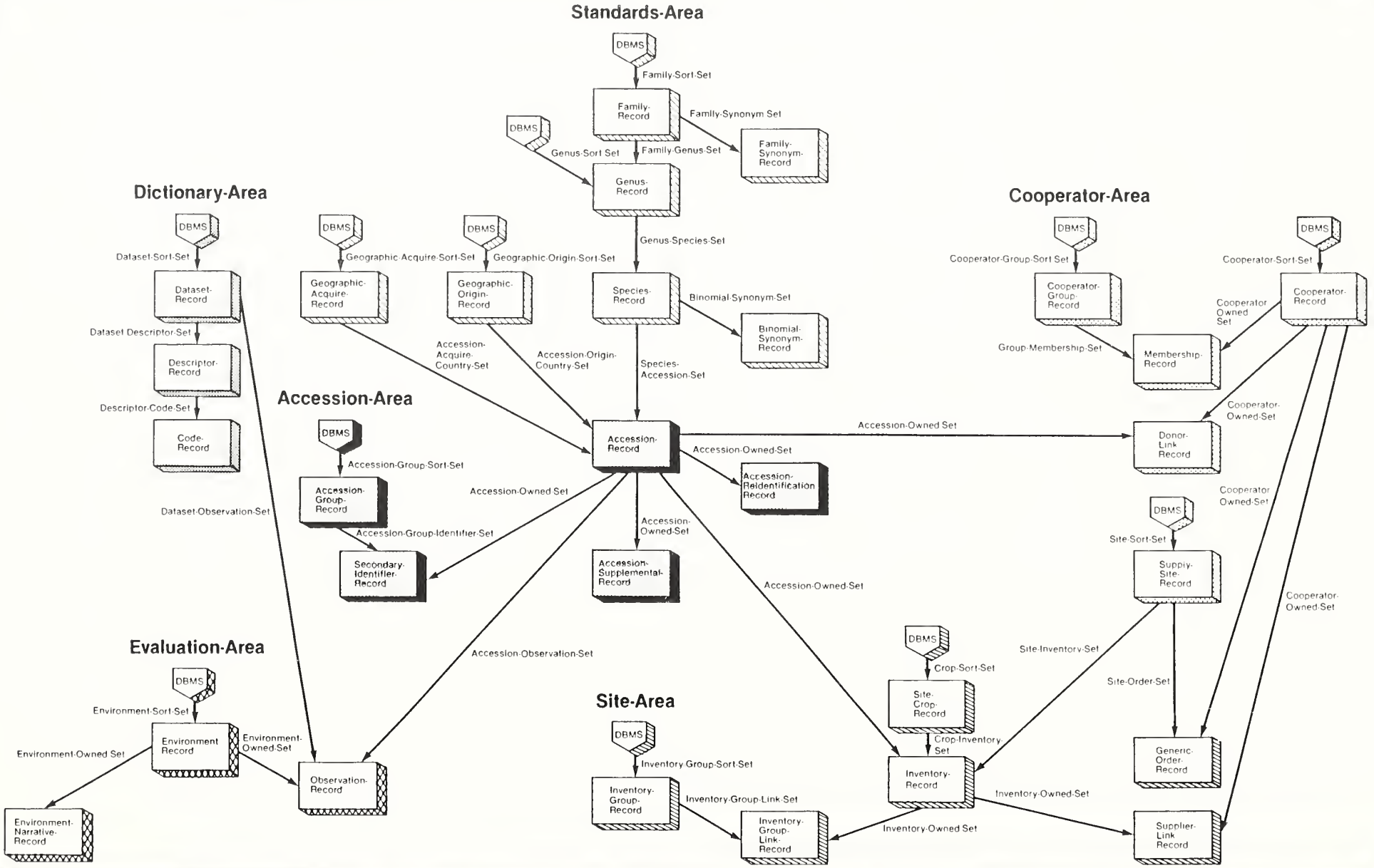
W-6 Chickpea Characteristic Data Report 2

| ID | NUMBER | RSIZE | SPRED | MATUR |
|---|---|---|---|---|
| PI | 212891 | 2 | 3 | 86 |
| PI | 212891 | 2 | 3 | 86 |
| PI | 212892 | 0 | 0 | 75 |
| PI | 212892 | 0 | 0 | 75 |
| PI | 222771 | 2 | 3 | 81 |
| PI | 222771 | 2 | 3 | 81 |
| PI | 254550 | 3 | 4 | 83 |
| PI | 254550 | 3 | 4 | 83 |
| PI | 273880 | 1 | 3 | 80 |
| PI | 273880 | 1 | 3 | 80 |
| PI | 360224 | 2 | 3 | 83 |
| PI | 360224 | 2 | 3 | 83 |

```
> quit
Do you wish to terminate this session? y
```

# GRIN Data Model

USDA-ARS



DATABASE MANAGEMENT UNIT

GERMPLASM RESOURCES INFORMATION NETWORK (GRIN)

| | | |
|---|---|---|
| Jim Mowder | Database Manager<br>ADP Technical Approval for Beltsville Area | 344-3318 |
| Shirley Freeland | Secretary | 344-1666 |
| Erick Abadie | Database Queries & Reports<br>Assist National Small Grain Collection | 344-1775 |
| John Belt | Public User Access<br>Discover<br>Prime Hardware<br>Communications | 344-2646 |
| Mark Bohning | Crop Advisory Committees | 344-1145 |
| Len Jansen<br>and<br>Quinn Sinnott | Scientific Data Management<br>(Data Preparation, Validation<br>and Loading) | 344-1775<br><br>344-3023 |
| Mark Perry | IBPGR<br>Documentation<br>GRIN Dictionary | 344-3133 |
| Rob Selvage | PRIME DBMS Software<br>Database Analysis, Design, Programming<br>Responsible for Maintenance of all Databases | 344-3699 |
| Krzysztof Obrebski<br>and<br>Ed Bird<br>and<br>Kurt Endress | Database Design<br>Computer Programming<br>Microcomputer Expertise<br>Graphics | 344-3699<br><br>344-3095<br><br>344-3095 |